

AQ-SPEC

Air Quality Sensor Performance Evaluation Center

Sensor Description

Manufacturer/Model:
Aeroqual
Model AQY v0.5

Pollutants:
NO₂ (V2)

Measurement Range:
0 - 500 ppb

Type: Gas Sensitive
Electrochemical (GSE)



Additional Information

Field evaluation report:

<http://www.aqmd.gov/aq-spec/evaluations/field>

Lab evaluation report:

<http://www.aqmd.gov/aq-spec/evaluations/laboratory>

AQ-SPEC website:

<http://www.aqmd.gov/aq-spec>

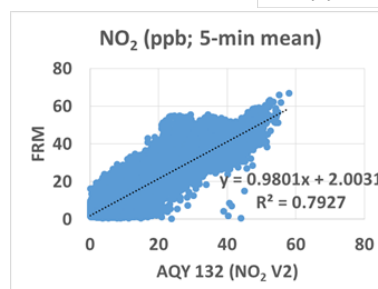
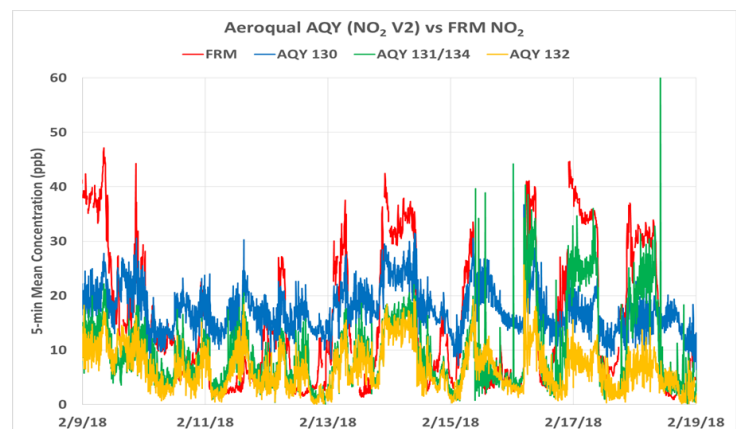
Evaluation Summary

- Overall, the three Aeroqual AQY sensors showed low accuracy. They underestimated the FRM NO₂ measurements for a concentration range between 0 to 150 ppb.
- The three Aeroqual AQY sensors exhibited high precision for most of the tested T/RH combinations in the environmental chamber, except at low NO₂ concentration under all T/RH combinations, in which precision could not be determined.
- Aeroqual AQY sensors showed low intra-model variability in the field deployment and low to moderate intra-model variability in the laboratory testing.
- Aeroqual AQY sensors had good data recovery (> 97 % for 5-min average in the field, and 100% for 1-min average in the laboratory).
- For NO₂, the Aeroqual AQY sensors showed good correlations with the reference instrument in the field ($R^2 \sim 0.77$) and a good correlation with the FRM instrument in the laboratory studies ($R^2 \sim 0.99$).

Field Evaluation Highlights

- Deployment period 12/22/2017- 03/27/2018: the Aeroqual AQY sensors (units IDs: 130, 131, 132, 134) showed good correlations with NO₂ concentration change as monitored by the FRM instrument.
- The units showed > 97% data recovery and low intra-model variability.

$R^2 \sim 0.77$



Coefficient of Determination (R^2) quantifies how the three sensors followed the NO₂ concentration change measured by the FRM instrument.

An R^2 approaching the value of 1 reflects a near perfect agreement, whereas a value of 0 indicates a complete lack of correlation.

Laboratory Evaluation Highlights

Accuracy

$$A (\%) = 100 - \frac{|\bar{X} - \bar{R}|}{\bar{R}} * 100$$

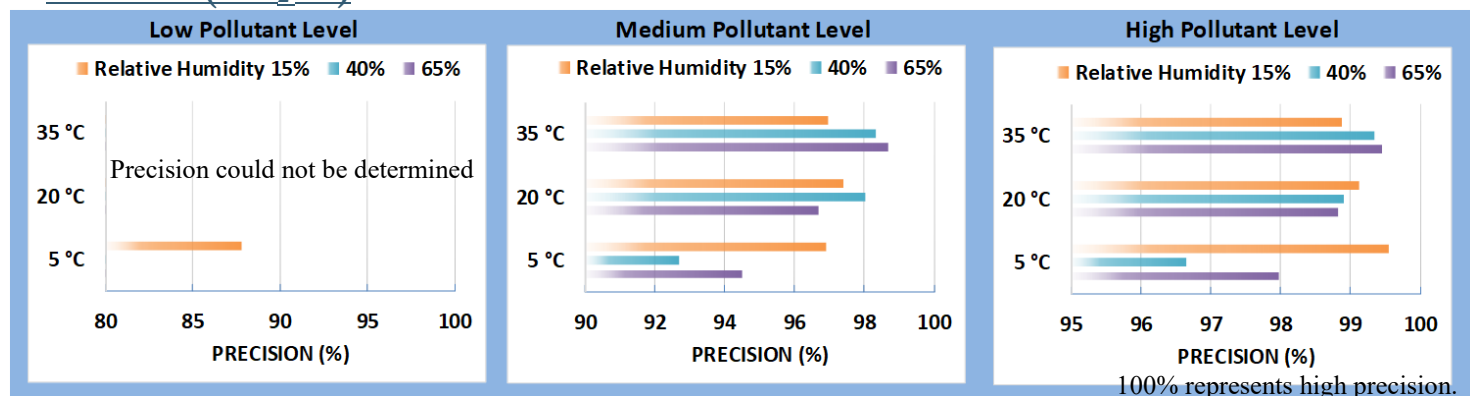
Steady State (#)	Sensor mean (ppb)	FRM (ppb)	Accuracy (%)
1	4.0	14.4	27.5
2	7.7	34.1	22.7
3	18.3	75.9	24.1
4	28.5	123.0	23.1
5	39.8	170.0	23.4

Accuracy was evaluated by a concentration ramping experiment at 20 °C and 40%. The sensor's readings at each ramping steady state are compared to the reference instrument.

A negative % means that sensors overestimate reference instrument's reading by 2 folds.

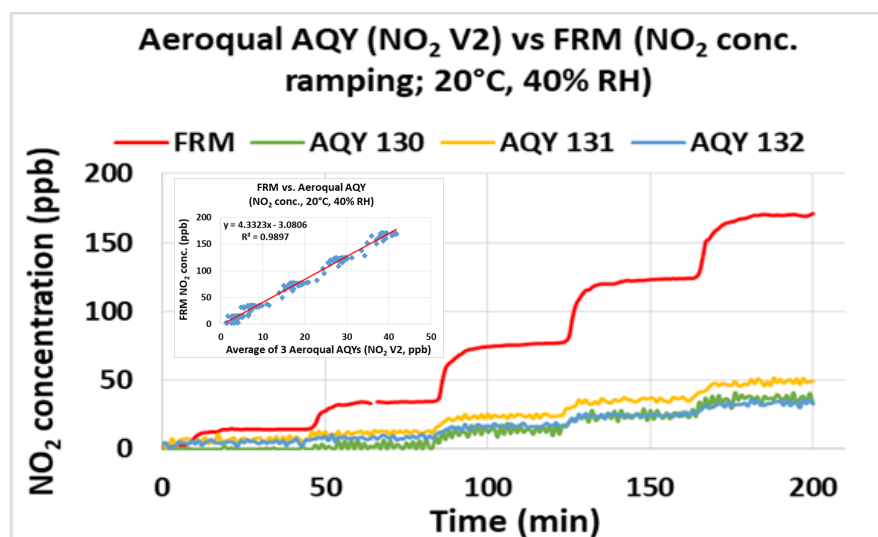


Precision (NO₂ V2)



Sensor's ability of generating precise measurements of NO₂ concentration at low, medium, and high pollutant levels were evaluated under 9 combinations of T and RH, including extreme weather conditions like cold and dry (5 °C and 15%), cold and humid (5 °C and 65%), hot and humid (35 °C and 65%), or hot and dry (35 °C and 15%).

Coefficient of Determination



The three Aeroqual AQY sensors showed good correlation with the corresponding FRM data ($R^2 \sim 0.99$) at 20 °C and 40% RH.

Climate Susceptibility (Coefficient of Determination R²)

R ²	5 °C	20 °C	35 °C
15%	0.933	0.974	0.985
40%	0.823	0.989	0.992
65%	0.939	0.975	0.992

Observed Interferents

Ozone interfered with the NO₂ measurement



All documents, reports, data, and other information provided in this document are for informational use only. Mention of trade names or commercial products does not constitute endorsement or recommendation. As a Government Agency, the South Coast AQMD and its AQ-SPEC program highly recommend interested entities to make use and purchase decisions based on the requirements of their study design, the technical aspects and features of their specific project applications.